WILDLIFE REVIEW

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The Transactions of the Second North American Wildlife Conference, a paper-bound volume of 661 pages, published in November 1937, may be obtained from the American Wildlife Institute, Investment Building, Washington, D. C., for $1.00 a copy.

Conservation: Fur animals

Van Cleve, Harry. Our fur bearers and their conservation, pp. 539-541.

Destructiveness of out-of-season trapping; pollution inimical to the semiaquatic fur bearers; need of better laws and more refuges, and of research upon fur animal problems; usefulness of skunk; improvement in methods of trapping.

Conservation: In Mexico

Zinser, Juan. [Conservation in Mexico], pp. 6-8.

Some of the problems of game conservation in Mexico and what is being done about them, especially in the case of quail and ducks.

Conservation: National program

Gabrielson, Ira N. The work of the Biological Survey, pp. 145-156.

Achievements toward the objectives outlined the previous year (see WILDLIFE REVIEW, No. 3, April 1936, pp. 34-35, and No. 6, November 1936, p. 6) are reported. Involved are the big game and migratory waterfowl refuge programs, cooperation with State and Federal conservation agencies, action with respect to the pollution problem, research activities, and basing productive regulations on the needs of wildlife. Notable events in State conservation, and needs of the Federal program, especially in research, also are discussed.

Conservation: Taylor Grazing Act

Mclohon, A. D. Taylor Grazing Act and wildlife, pp. 159-167.

Ownership of western lands and classification according to chief use; nearly 540,000,000 acres or 72 percent is regarded as primarily suitable for grazing. Under the Taylor Grazing Act, 49 grazing districts have been set up embracing 253,000,000 acres of land. They are controlled by local boards but all appellate power has been retained in the Department of the Interior. The Act provides for cooperation with stockmen's associations, and State land and conservation officials interested in the use of grazing districts. In New Mexico the appointment is authorized of one advisor in each district to represent wildlife and recreational interests and the special rules for that State require that in estimating carrying capacity of range, allowance be made for reasonable utilization by wildlife, and further provide for the

establishment of game refuges and for control of overpopulations. Measures adopted or plans affecting wildlife in other States also are reviewed. Game ranges set up under a plan of cooperation with the Biological Survey include three established and five under consideration. In addition, the Division of Grazing has approved the alienation of lands from grazing districts and their inclusion in six wildlife refuges in five States under the sole jurisdiction of the Department of Agriculture.

Conservation: Threatened species

Pough, Richard H. An inventory of threatened and vanishing species, pp. 599-604.

Pointing to the extermination of the great auk, Labrador duck, passenger pigeon, Carolina paroquet, and heath hen, the author emphasizes the danger of the same fate overtaking the California condor, ivory-billed woodpecker, roseate spoonbill, whooping crane, and others. Effective action includes protection, provision of adequate suitable environment (for the appraisal of which in each case research may be necessary), and guardianship of each species by an agency definitely responsible for its preservation.

Conservation: Waterfowl, Canada

Lloyd, Hoyes. Canadian comment on waterfowl, 1936, pp. 180-183.

Devastating effect of drought on the great plains breeding grounds; areas once ideal for waterfowl were completely dry in 1936. The black duck, a northeastern breeder, made a strong recovery after great losses due to the abnormally severe winter of 1933-34. The eider also has responded well to improved protection. Increased restrictions on shooting privileges in Canada; necessity of gradual accomplishment in this respect concurrent with advance in public opinion which cannot be had without a continuous campaign of education.

Conservation: Waterfowl, United States

Lincoln, Frederick C. The waterfowl situation, pp. 168-179.

Limited extent of the effective breeding range of game ducks, an area greatly impaired and reduced by settlement and its accompaniments. Methods used in inventory of the stock including breeding ground survey and winter count. Evidence as to status of the waterfowl population from studies along the migration routes and in Mexico. There has been a definite improvement since the low of 1934 but enormous areas in the north still support but a fraction of their total capacity in ducks and geese.

Conservation: Wildlife, Canada

Lloyd, Hoyes. Wildlife conservation in the Northwest Territories of Canada, pp. 184-187.

Introduction of improved firearms and traps increased destruction of wildlife. Establishment of refuges as Wood Buffalo Park, Thelon Game Sanctuary primarily for musk-oxen, and the Mackenzie range for reindeer. Law enforcement in the region. Value of furs in fiscal year 1935 and numbers of skins of five species reported.

Conservation: By Women's Clubs

Bogert, Mrs. H. G. The conservation program of the General Federation of Women's Clubs, pp. 126-133.

The General Federation of Women's Clubs has interested itself in wildlife conservation since 1898 and has joined in many subsequent efforts to obtain protective legislation. The Federation wants politics kept out of conservation and the movement directed for the benefit of all citizens. Education is recognized as of primary importance and compulsory education in conservation is urged in all States. The Federation insists on care, understanding, and vigilance on the part of those in control of wildlife. There is a general interest in small refuges for waterfowl which the Federation fosters. Activities for club study in wildlife are listed. By participation in a reforestation campaign ("A Federation memorial forest in every state--an acre for every club"), the Federation is building up wildlife resources. Its program is chiefly one of education through a program correlating human welfare with conservation.

Cycles: Water levels

Wing, Leonard W. Cycles of water-levels, pp. 346-379, 12 figs. (graphs), 16 tables.

Rainfall is cyclic and is correlated with fluctuations in sunspot abundance. "This paper is an attempt to interpret the results of rainfall study in terms of wildlife." Records from stations in or affecting the Mississippi flyway are tabulated and graphed. The author concludes: "A definite downward trend in the rainfall since the middle of the last century seems established beyond a doubt. Its influence upon water levels and consequently waterfowl seems sufficient to warrant more than a passing glance. If we are in the midst of the low of the long-time cycle, there is little immediate hope for relief from its effect. Our whole efforts must be concentrated upon conserving the maximum amount of water and of obtaining the maximum benefit from the water we are fortunate enough to receive." Bibliography of 22 titles.

Cycles: Wildlife

Wing, Leonard W. Further studies of wildlife cycles, pp. 326-339, 7 figs., 5 tables.

Quotation of two paragraphs may suitably abstract this paper. "The evidence accumulating on cyclic fluctuations in wildlife leads to the conclusion that it is no longer safe to label any animal as non-cyclic without

exhaustive study of its population levels; and that it is no longer safe to label any factor as the cause of the cycles on the basis of correlation with the cycles. The problems of population cycles are extremely complex and in need of more study before any conclusions can be given with justifiable finality."

"Numerous correlations occur between wildlife, solar and meteorological data and other phenomena. While these correlations are apparently true, it is not possible to assign any definiteness nor cause and effect to any of them with precision. The unknown factors are too great in the face of our present knowledge of wildlife to assign a role to each of the possible affecting agents. The general correlation between so many separate phenomena furnishes strong testimony that the roughness of the data and sketchy knowledge of wildlife is being transcended by phenomena of great magnitude and that the fluctuations are being guided by forces other than accident."

Application of cycles in climatic phenomena to fluctuations in numbers of woodcock, bobwhite, and ruffed grouse are pointed out. There is a bibliography of 7 titles.

Destruction: Habitat for wildlife

Ligon, J. Stokley. Tragedy of upland game birds throughout the West and Southwest, pp. 476-480.

A leading reason for the tragic plight of wildlife is the typically American abuse of perishable national resources. As applied to upland game birds, habitat has been steadily deteriorated by overgrazing, clean farming, and other exploitation, until now the birds in most sections must resort to abnormal habits and to artificial sources of food in order to survive. Little is being done to restore good living conditions and the more popular restocking ventures are doomed to failure "as restoration of habitat must precede restoration of game." The inadequacy of environment leads to concentrations of game in favored spots, gatherings that are misinterpreted by hunters as samples of a bountiful supply. A reformed land-use program is necessary; efforts toward that end in New Mexico are mentioned; and the necessity of cooperation by all interested parties pointed out. Even "if beneficial wildlife can be restored to all available range, once it is revegetated through controlled grazing and proper game management, there will be little enough game to meet the demands of the future." [Ligon's remarks, in many respects like those of the much-castigated nature lovers, are commended to those whose sports include heaving rocks at "sentimentalists", for Ligon, a career-long collector and hunter, employed years in the predatory animal and rodent control work of the Biological Survey, and now a game farmer and game specialist, can hardly be classed as a sentimentalist. Yet he shows the same alarm at the appalling depletion of our fauna and calls for some of the same remedies.]

Destruction: Lead poisoning

Shillinger, J. E., and Clarence Cottam. The importance of lead poisoning in waterfowl, pp. 398-403, 2 tables.

Action of digestive system leading to lead poisoning, symptoms, lesions. Older records of the trouble and notes on several more recent instances. Tabulation of the frequency of occurrence and number of shot found in duck stomachs examined in the Biological Survey. Conditions favoring ingestion of shot are widespread and about half of the waterfowl sent to the Biological Survey for determination of the cause of death are found to have died from lead poisoning. Losses occur mainly among adult birds, survivors of the hunting season, hence are important as cutting down essential breeding stock.

Disease: Sylvatic plague

Day, Albert M. Sylvatic plague, pp. 555-560.

Sylvatic plague is carried by native animals, bubonic plague by domestic rats; they are regarded as phases of the same disease. Review of outbreaks of plague, particularly those of fairly recent date. Diagnosis of sylvatic plague by species of rodents and localities in the Western States. The disease probably cannot be eliminated but its principal menace might be removed by maintaining zones free of carriers about cities. Local control reduced the prevalence of relapsing fever carried by chipmunks and may prove equally helpful in controlling restricted outbreaks of sylvatic plague. "At the present time there is not much danger of large numbers of human beings contracting plague of the bubonic type from wild rodents, as the deaths have averaged only one or two a year. This form is transmitted to man chiefly by insects. Authorities fairly well agree, however, that where there is a sylvatic-plague epizootic among rodents, the chances for an outbreak of the pneumonic type of plague are greatly increased. The pneumonic type may be transmitted from man to man, is highly infectious, and, like influenza, is difficult to control. The dangerous possibilities of the disease must not be minimized."

Diseases and Parasites: Shared by livestock and wildlife

Shillinger, J. E. Disease relationship of domestic stock and wildlife, pp. 298-302.

Wildlife has much lower tolerance of unsanitary surroundings than does livestock and cannot be successfully propagated when crowded or exposed to disease. On the other hand, livestock has acquired no doubt from American wildlife certain parasites unknown in its place of origin--the Old World; these, however, are not known to be seriously destructive. Transfers in the opposite direction, on the contrary, have resulted in great losses, as from canine distemper on fox farms and various poultry diseases in upland game bird propagating establishments. Among wild animals the situation is even more serious as illustrated by the history of necrotic stomatitis and of foot-and-mouth disease among native ruminants. Tuberculosis, Bang's disease, and rabies are other dangerous diseases introduced to American wildlife. Contamination of range may have been an important factor in the local extirpation of certain big game, especially mountain sheep. Scabies and actinomycosis are known to have been involved in some of these instances. It is conceivable that if intermingling is not ended certain important wild game may suffer complete extinction.

Ecology: Animal relations to soils

Van Dersal, Wm. R. The dependence of soils on animal life, pp. 458-467.

This paper previously published by the National Association of Audubon Societies was abstracted in WILDLIFE REVIEW, No. 9, July 1937, p. 11.

Ecology: Crow-waterfowl relationships

Kalmbach, E. R. Crow-waterfowl relationships in the prairie provinces, pp. 380-392, 1 table.

A paper based largely on U. S. Department of Agriculture Circular 433, "Crow-waterfowl Relationships," by the author, which was abstracted in WILDLIFE REVIEW, No. 10, October 1937, pp. 9-10. There is additional comment especially that deprecating undue extension of the findings which may well be cited. The problem is limited geographically and, except for minor colonies of ducks on northeastern and northwestern coasts, is restricted in this country largely to the States of Minnesota, North Dakota, South Dakota, northern Nebraska, and Montana. In Canadian territory, not more than a sixth of the area occupied by breeding ducks and geese is also inhabited by a potentially destructive crow population. The author urges that the results of a very local study in Canada should not be construed as average for the whole Dominion nor interpreted as representative of crow-waterfowl relationships throughout this country. [As could have been foretold by anyone acquainted with the habits of propagandists, these "must nots" have already been perpetrated.]

The author admits the need of local repression of crows but points out how it should be safeguarded. "Crow control operations on duck-breeding grounds should by all means be kept in the hands of those who fully recognize the hazards associated with human intrusion on waterfowl grounds during the nesting season. They should not be carried out haphazardly or by mass action devoid of careful supervision. There should, in fact, be solicitude for the privacy of every nesting duck. At winter roosts, where control is possible at a lower cost per bird, the benefits with respect to waterfowl are in turn less direct, since only part of the birds present at these roosts actually enter the problem of crow-waterfowl relationships on the breeding grounds.

"For the present, and probably for years to come, such control may wisely be restricted to those Federal, State, or privately managed areas to which crows have been attracted in unduly large numbers by the presence of nesting waterfowl and on which the consequently delicate problem of control may be kept in experienced hands. It is only under such conditions that we may effectively determine its ultimate value and economy in terms of increased waterfowl yield. There is nothing, however, in the results of this study at this time that will warrant the prophecy that a nation-wide, intensive, anti-crow campaign will bring benefits in the form of an appreciable increase in the continental supply of wild fowl."

Ecology: Grazing in relation to duck nesting

Bennett, Logan J. Grazing in relation to the nesting of the blue-winged teal, pp. 393-397, 3 tables.

Reporting on observations on a bluegrass tract bordering a lake that has been under observation since 1933, the author states that grazing one cow per 6 acres in normal years appears to be beneficial to duck nesting areas in Iowa. The benefits are in making trails that broods seeking the water can traverse easily and in keeping down populations of skunks and badgers, animals that destroy some nests.

Ecology: Populations, quail on cutover land

Lay, Daniel W. Some relations of bobwhite quail to second-growth pine woodland in Walker County, Texas, pp. 575-578.

Author's summary:

"1. Opening up the woodland by cutting pine timber starts a series of changes in vegetation that may be grouped in four stages: sprout and seedling from about 1 to 4 years after cutting; early intermediate from about the fifth to the ninth years; late intermediate from about the tenth to the fourteenth years; and mature after the fourteenth year. In the mature stage the sapling pines begin to overtop and dominate other species; in the late intermediate stage broomsedge and associated grasses reach a climax and then weaken as the brush thickens. Weed-type herbaceous species are most vigorous in the early intermediate and sprout stages. In the sprout stage the herbaceous species make steady increases each year along with the sprouts and seedling trees.

"2. Quail also seem to fit this four-stage classification. Census areas totaling 4,749 acres of interior pine woodland show averages in acres per covey of 140.6 for the first four years, 78.9 for the fifth to ninth years, 95 for the tenth to fourteenth years, and about 546 for the older tracts of woodland. A majority of the coveys in the last two age groups was in or near old clearings with vegetation similar to that of the early intermediate stage.

"3. Dogs were of little use for census of quail in large tracts of woodland. Well organized drives with CCC men gave satisfactory counts of coveys but not of covey size.

"4. Proper control of the vegetation in order to maintain the conditions of the early intermediate stage would certainly extend the period of highest concentration of quail in cutover pine woodland similar to that of Walker County, Texas."

Ecology: Populations, quail on small farms

Lehmann, V. W. Quail and cover on three Central Texas farms, pp. 570-574.

"Case histories" of farms of 36, 75, and 165 acres on which the quail population was censused and changes in cover and food conditions noted for 9, 9, and 6 years, respectively. Running account of the observations is given. The conclusions drawn are as follows: "(1) Quail populations may be expected to fluctuate rather markedly on small tracts. It appears that annual winter populations are greatly influenced by habitat changes resulting from cover manipulation; (2) an annual increase or decrease in the winter population is seldom directly proportional to the quantity of cover which has been changed; (3) the habitability of individual covey territories appears sometimes to depend on the existence of certain strategically located clumps of 'key' cover. That protective vegetation which for lack of better name has been termed 'key' cover may be a small plum thicket; a single brush pile, or a vine-covered tree; (4) quail as a species seem remarkably adaptable to changes in their habitat. Quail, however, seem adaptable only to a certain point which varies rather considerably in the case of individual coveys; (5) on small individual tracts the annual winter populations are seldom directly proportional to the number of seed stock which have survived the previous hunting season; (6) it appears that the influence of annual shooting on quail increase is not easily evaluated from fall and winter counts of quail populations on small individual tracts; (7) on any single tract, the effects of hunting pressure are modified in accordance with the percentage of kill on neighboring areas; (8) quail populations seemingly tend to 'level out' in the interim between hunting seasons; (9) winter quail populations at nearly the same level for periods of several years are not thought to be accurate measures of the carrying capacity of small tracts; (10) suitable habitats and moderate harvests are the best, but not absolute guarantees of annual winter populations on individual small farms."

Ecology: Range biota

Verhies, Chas. T. Inter-relationships of range animals, pp. 288-294.

Bearing of remarks restricted to the southwestern semi-arid region; not only all the animals but both animals and plants have inter-relationships. The removal of single species may cause disturbance of the whole complex. The philosophy of range management should be the balancing of species, one against another for mutual control, rather than the elimination of particular species that offend us. Discussion of insects and rodents as consumers of vegetation and of predators, both avian and mammalian, as destroyers of the plant-eating forms. Examples of sphinx moth larva and grasshopper destruction by Swainson's hawks. "Control," admittedly necessary at times, is overdone and often economically unjustifiable. Growth in appreciation of the importance of the biotic complex is recognized but a great deal more is needed. Increased research is indispensable to sound management. What is required above all is real interest in, and love of, nature to replace so far as possible the "killing madness."

Ecology: Small mammals

Komarek, E. V. Mammal relationships to upland game and other wildlife, pp. 561-569, 1 graph.

The author considers that exploitation of land in the Southeast has materially affected the composition and distribution of the mammalian fauna and doubts that reverted areas will return to their original condition. The cotton rat consumes quail eggs and this species and other rodents compete for food with upland game. So-called "buffer" populations may increase rather than restrict predation by attracting predators. Desirability of local study of predation where conditions are well understood. Neither predators nor carriers of parasites should be eliminated until that is shown to be the proper course by a much more detailed knowledge than we now have as to how they fit into the web of life. The author is studying life histories of various mammals and has made most progress with that of the cotton rat. This species is cyclic with a period of 4-5 years; the cause of the die-off has not been determined. There is also a regular yearly drop in numbers in the spring. Comment on methods of estimating populations of small mammals.

Economics: Value of beaver

Finley, Wm. L. The beaver--conservor of soil and water, pp. 295-297.

Trapping out beavers a mistake in view of their value as conservers of soil and water. Removal of 600 beavers from a valley in the Ochoco National Forest, followed by disappearance of their dams, reduced pasturage from 15,000 tons worth from $3 to $5 a ton to a few hundred tons. Good trout streams disappeared, the water supply lessened, requiring expenditure for wells and ruining farms dependent on irrigation. The trappers got about four or five thousand dollars in one year, the stockmen have lost $50,000 a year ever since. This instance shows that while a dead beaver may bring $10 to $15, a live one is worth $300. The beaver doesn't fit in some communities but should be moved, not killed. By this method the number of small storage reservoirs in eastern Oregon is being increased, thus gradually building up a wealth in water resources that was once destroyed.

Education: Conservation principles

Einarsen, Arthur S. Educational phases of conservation research, pp. 119-125, 1 table.

with

Opportunities for work/game commissions, planning councils, colleges, extension services, 4-H clubs, farmers, and sportsmen. Need of annual inventory of wildlife and of a unified system of taking it. Principles of conservation: "(1) In order to have an increasing return the annual take must be less than the annual increase; (2) natural reproduction is the most economical and continuous method of increasing wildlife. Artificial propagation applies where the wildlife population is too low to build back; (3) inferior strains of a species of animal, of bird, and of fish should not be bred for restocking; (4) these inferior forms should be taken during the open season in preference to the perfect specimens until a better blood line is developed; (5) pregnant or breeding beasts, nesting birds, and spawning fish should not be taken; (6) all wildlife should have unmolested breeding grounds;

(7) the shooting of females in big game should not be tolerated when increasing returns are desired. When the carrying capacity of an area is reached then management must limit both sexes; (8) coveys should not be shot to the last bird." Wildlife must be dealt with as a crop.

Education: Extension in wildlife restoration

Bode, I. T. Extension work in wildlife restoration, pp. 62-67.

Employment of an extension biologist by the U. S. Extension Service and of full-time extension specialists by Iowa and Texas. Through 4-H clubs in 1935, a hundred thousand boys and girls took some part in conservation activities. Recognition of the dominating factor of land ownership; the need of fundamental knowledge for land-planning. Plans for wildlife extension from both the Federal and State points of view.

Education: Wildlife extension

Callender, R. E. Wildlife extension work in Texas, pp. 190-193.

Conservation has been the keynote of farm demonstration work since the beginning, hence the program easily accommodated a wildlife addition. Texas wildlife had a value of 94 million dollars for the year 1935. Management demonstrations must reach the man who controls the land. They are carried on by county agents under agreements with landholders to conserve and increase desirable wildlife on areas marked by protective signs showing the cooperative nature of the project and its connection with the Texas Agricultural and Mechanical College. Programs are adopted by associations of landowners. Half a million acres in 8 counties were organized in two months.

Food Habits: Acorn consumers, inter-relations

Lay, Daniel W., and Hilbert R. Siegler. The blue jay as link between acorn and quail, pp. 579-581.

Blue jays break open acorns, thousands under single trees, thus making fragments available to quail. In Walker County, Texas, their influence is superior in this respect to that of hogs and squirrels. The article contains quantitative data on production of acorns and on fragmentation of these by jays and hogs.

Food Habits: Deer browse, Kaibab

Julander, Odell. Utilization of browse by wildlife, pp. 276-287, 2 charts, 1 table.

Browse assumes great importance as being the chief food on winter range, the capacity of which is often the limiting factor on big game populations. Degree of utilization of browse is the best criterion as to density of the consuming population and is more easily reckoned than is the number of the

animals. This study was made on the once seriously overpopulated Kaibab National Forest. A table is presented showing the preferences of deer, cattle, and sheep for the important forage plants. Key species in management of the range for deer are aspen and cliffrose. The tolerance of these species for browsing was studied by means of exposure to deer until the desired degree of utilization was effected and also by clipping experiments. Aspen, 65-70 percent utilized, still made gains in both height growth and shoot production. Cliffrose also withstood about the same percent of utilization and browsing up to 65 percent is beneficial in stimulating growth of this plant.

Food Habits: White-tailed deer, N. C.

Stegeman, LeRoy C. A food study of the white-tailed deer, pp. 438-445, tables.

Studies on the rather heavily populated Pisgah Forest, N. C. Notes on methods used and on palatability ratings obtained; leaders in this respect for the summer season, among trees were basswood, chestnut, sourwood, and dogwood; and among shrubs and vines, pepperbush, grape, and two species of greenbrier. As to quantitative forage value in oak-chestnut forest, chestnut, red maple, dogwood, and red oak ranked highest. There are a number of general observations on the effects of the deer population on the forest, and on adaptability, habits, and management of the animals.

Life Histories: Cottontail, Connecticut

Dalke, Paul D. A preliminary report of the New England cottontail studies, pp. 542-548.

Arrangements for collecting specimens; method of preserving skins. Study of flat skins shows one molt a year after the breeding season. Pregnancies were noted from April to August; the number of embryos averaged 5.2, of young in nests 3.8; two or three litters per season are commonly produced. Parasitism is usual; external and internal parasites identified are listed. Trapping and tagging studies indicated an activity range in fall of .5 to 1.8 acres. The average weight in fall of females was 2.78 pounds and of males, 2.63. Grasses and clovers were the most important summer foods. Better interspersion of food and cover tracts, the greatest need, is the special object of management studies.

Life Histories: Cottontail, Iowa

Hendrickson, George O. The Mearns' cottontail in Iowa, pp. 549-554.

When protection was given rabbits, complaints of damage multiplied, but when the remedy was proposed of trapping the animals and moving them elsewhere, the complainants mostly decided to keep the bunnies. Valuable trees were protected by cylinders of fine wire mesh or by using food supplies (clipped branches) to lure the animals away from the orchards. A rabbit shortage invited attention to diseases and parasites; the findings are informally noted. Some of the cottontail shortage may have been due to increased predation by

foxes facilitated by destruction of cover by the grasshoppers and chinch bugs that were so abundant during abnormally dry years. Neither rabbits nor other vertebrates were killed by the poisoned bran used in controlling the grasshoppers. Cover is of great importance in holding cottontails; the value of different kinds is commented upon, as is also success in getting farmers to provide cover. Bibliography of 6 titles.

Life Histories: Hungarian partridge nesting

Hawkins, Arthur S. Hungarian partridge nesting studies at Faville Grove, pp. 481-484.

Nesting densities (rarely exceeding a bird to 6 acres) in North Central States are lower than reported elsewhere, so search was made for a reason. In Wisconsin the birds prefer natural cover but losses in roadside cover are almost as great as those in hayfields, which are regarded as the most hazardous environment. Notes are given on the vegetation of nest sites, numbers of nests found in different environments, and the losses in each, but admission made that little light has been thrown on the initial problem.

Life Histories: Muskrat

Errington, Paul L. Habitat requirements of stream-dwelling muskrats, pp. 411-416.

Account of observations, chiefly in Iowa, showing the vital importance to the animals of permanent pools in streams and of suitable sites for burrows; also recourses of the animals during floods.

Management: Deer weights and measurements in relation to

Johnson, Fred W. Deer weights and antler measurements in relation to population density and hunting effort, pp. 446-457, 8 tables.

Weighing and measuring deer on the Allegheny National Forest in Pennsylvania demonstrated that density of population, food shortage, and physical deterioration are correlated. Studies of the effect of hunting on deer populations in California show the value of statistics on age classes, weights, etc., in connection with management.

Management: Farmer-sportsman relationship

Hicks, Lawrence E. The controlled hunting areas and the pheasant refuge management system in Northwestern Ohio, pp. 589-598.

This paper as released by the Ohio Wildlife Research Station was abstracted in WILDLIFE REVIEW, No. 8, April 1937, pp. 21-22.

Management: Forest game

Shantz, H. L. Sociology of a forest unit, pp. 311-325.

Geological and climatic influences are described to introduce this ecological varying to economic treatment of a somewhat idealized National Forest region of the Southwest. The natural production of the area is discussed in relation to the support of a human population. In an advanced pastoral stage conflict between game and domestic stock becomes pronounced and the forester, confronted with such problems as well as by those peculiarly his own, must find a way to harmonize the needs of wildlife with those of two great industries, lumbering and grazing. To prevent deterioration, range managers when estimating carrying capacity should take into consideration average or even the worst years with respect to food supply. The interactions of wildlife populations also require constant use of a factor of safety with respect to utilization. Relation of human population to wildlife, control of hunting, and management of game species so as to maintain optimum populations. Under its multiple-use program, the Forest Service makes adjustments to fit conditions but the carrying capacity of the range must remain the measure of its use and pressure for game or livestock privileges must not force a destructive use of this natural resource. Resume of Olson's study of range competition phenomena in Utah, including a comparison of revenues derived from hunting and from cattle-raising: $50,000 to $80,000. A large number of people are interested in the hunting. "It is a difficult task to determine the commensurability of the various interests and yet hold true to the principles of the best use of land and not permit destructive use."

Management: Fur resources

Oakes, R. S. Wildlife restoration and the American Trappers Association, pp. 531-535.

Repetition of the main planks of the platform which was reproduced in WILDLIFE REVIEW, No. 6, November 1936, pp. 19-20, and addition of supporting arguments. A live and let live discussion of sportsmanship.

Management: Fur resources

Schiele, S. M., Chairman. [Resolutions by the Fur Resources Management Section], pp. 523-525.

Slightly abbreviated, the resolutions are:

"1. That the economic and social value of fur animals as a natural resource be more generally and specifically recognized by state and federal governments and that it receive financial support for development from state and federal governments commensurate with its importance and value. x x x

"2. Inasmuch as basic statistical data essential to intelligent fur resource management has been heretofore impossible of attainment, we recommend that state and federal governments cooperate in a survey of the latent as well as visible supply of fur animals and we also suggest as the first step towards

this end, that the states inaugurate a reliable system of recording the annual catch of fur animals.

"3. It is recommended to the states that their trapping laws be amended to segregate trapping from hunting and fishing by the issuance of trapping licenses to trappers at a reasonable fee, and that said fee be used for the purpose of promulgation and propagation of fur animals in said states.

"4. In order to enhance the economic value of fur resources in the administration of public lands, we urge that surveys be made by appropriate governmental agencies of areas in the Public Domain adaptable as, or affording suitable, habitats for fur animals, and, further, that such areas in so far as practicable be devoted to developing and maintaining this natural resource.

"5. That in particular no reclamation, irrigation, or drainage projects shall continue to be undertaken without the approval of the Biological Survey after this organization has determined the effect of such projects upon the natural supply of fur animals on the land under consideration.

"6. That the appropriate authority in the federal government be urged to gather statistics of the take of fur because this return is essential if this great natural resource is to be safeguarded adequately.

"7. We approve of the reduction of the use of poison by the government in predatory animal control, and recommend that this reduction should be continued and that other methods less questionable from the standpoint of conservation should be attempted. We further recommend that predator control be strictly limited to areas in which depredations are of severe consequence.

"8. We recommend an open season of not more than two months in the prime-fur season of any year, with due allowance for exceptions rendered necessary by local conditions.

"9. Realizing that some states have a closed season on fisher, wolverine, and marten, we recommend a closed season of at least five years' duration throughout the entire country on these animals. x x x

"10. We deprecate the activities of dealers in illicit furs, especially beaver, and suggest continuance of the aggressive policy on the part of the government with which the raw fur trade at large will cheerfully cooperate.

"11. We heartily endorse the development of fur-animal production on farms as well as the restoration and conservation of these animals in the wild as a means of increasing the income to agriculture.

"12. We strongly urge that the project of conservation education in respect to fur bearing animals in the public schools and in all other junior activities shall be carried forward."

Management: Harvesting muskrats

Pancoast, John M. Muskrat industry in southern New Jersey, pp. 527-530, 3 tables.

Acreage of marshes in 5 counties of New Jersey; size of holdings in Salem County. Best foods cattail and three-square; tidal conditions; trapping customs. The normal annual catch for marsh is 3-1/2 muskrats, and for ponds, 6, per acre. The catch of two marshes for 10 and 13 years, respectively, is reported, mostly in percentages of the normal take. Storm tides and severe weather decimate the animals; foxes recently introduced kill a good many, and caterpillers sometimes make serious inroads on the food supply.

Management: In national forests

Shantz, H. L. Wildlife on the national forests, pp. 134-144.

Sketch of the distribution and extent (200,000,000 acres) of 154 national forests. Interest in wildlife of the forests has steadily grown and for about 20 years the Forest Service has been making special studies as a basis for administration of wildlife. Summary of a report on the years 1933-35 that has been published elsewhere (see WILDLIFE REVIEW, No. 4, June 1936, p. 2). Wildlife population of the forests in 1935, number and extent of refuges, and need for additional winter range. In the past year, 83 men have been employed in the national forests on wildlife assignments. Eight of the 10 Regions have men to head up the wildlife work for these districts as a whole. In addition, about 1,500 regular employes are giving wildlife a prominent place among their regular duties and activities. Cooperation with the Biological Survey and Bureau of Fisheries. Account of principal achievements in wildlife work in 9 forest regions.

Management: In national parks

Russell, Carl P. Opportunities of the wildlife technician in national parks, pp. 68-77.

The greatest problems in this field arise from joint occupancy of park areas by wildlife and by people. History of wildlife studies and management in the National Park Service and outline of projects for 9 of the parks. Cooperative and research work and plans for the future; recreational surveys; desirability of publication of the results of wildlife investigations.

Management: Pheasant, Pennsylvania

Gorstell, Richard. The status of the ringneck pheasant in Pennsylvania, pp. 505-511.

A condensed account of studies of this bird now occurring in agricultural sections of every county of the State; the first successful colonization was in the early 1890's. The stock is a mixture of two species, three subspecies, and one mutant; male birds killed in November weighed from 2 to 3.82 pounds (average 2.87); the annual kill approximates 250,000 cock pheasants,

and the population has in recent years remained about stationary. Areas having high population densities are described; they seem to be correlated with outcrops of limestone; reason unknown. Discussion of damage to corn and tomatoes, and destruction of young quail and rabbits (scarcely credited), and the offsetting consumption of Japanese beetles. The daily bag limit appears to be the legal restriction which has played the major role in curtailing the kill. Staggered seasons apparently result in greater kills than straight seasons of the same length. Results of stocking policies and changes in them are discussed.

Management: Planting for erosion control and wildlife

Stevens, Ross O. Making erosion control benefit wildlife, pp. 268-275, tables.

Working under cooperative agreements with farmers, the Soil Conservation Service tries, wherever practicable, to mould regular farming operations so that they will benefit wildlife, to develop and maintain sufficient areas on each farm so that the basis of a permanent wildlife program may be established, to familiarize farmers with general wildlife management principles, and to develop an appreciation of wildlife values so that the work will be continued. Recommendations of the Service to forward these ends in the Southeast are described; from 2 to 10 (averaging 3 to 6) percent of farm areas are involved where permanent wildlife management is the objective. Income from leasing of shooting rights may amount to 10 cents per acre for the entire farm, hence remuneration for the small proportion of the land actually devoted to wildlife may be relatively high. Treatment of gullies, gall spots, and other eroded areas as well as of land retired from cultivation is described and the plants used for the purpose, and rate and season of seeding, specified. Woody plants suitable for various sites also are recommended. These matters are presented in greater detail in the author's Farmers' Bulletin 1788, "Wildlife Conservation Through Erosion Control in the Piedmont" (abstracted in WILDLIFE REVIEW, No. 11, February 1938, p. 23). Ninety out of 103 farmers signing cooperative agreements are actively participating in wildlife work.

Management: Planting, general principles

Whitaker, H. L. Natural vegetation in soil conservation and wildlife management, pp. 468-475.

A discussion from the ecological point of view of the effects of erosion, of a land-use program covering wildlife interests, of wildlife management especially planting as part of that program, and the value of preparatory surveys.

Management: By public and private agencies

Bennitt, Rudolf. Development and maintenance of food and cover--where and by whom?, pp. 264-267, tables.

From a table of land uses in Missouri, the author computes that considerably less than half of the area of the State can ever be used for active development of game food and cover. From figures on land ownership, he concludes that of the manageable game range only about 28 percent of the area of the State is in private holdings. Increasing public and dwindling private responsibility for game management is indicated. Poorer lands tend to gravitate to public, richer tracts to private, ownership. The various land-managing agencies should go forward together, each developing management policies suited to the land and game under its control and each aware of its limitations.

Management: Refuges, in Mexico

Zinser, Juan. Big Bend International Park, pp. 9-12.

Treaty for the establishment of international parks. Objectives include conservation of wildlife. Proposals for making a refuge of a strip 15 miles each side of the international boundary, and for other special reservations for migratory birds and big game. Status of bighorn sheep in Mexico. Overgrazing in relation to deer; reserving areas for deer; and prescribing rotation of grazing under which the cattle graze in a large circle so that when they come back to where they started, the grass has grown again. List of national parks of Mexico and notes on forest reservations.

Management: Soil Conservation Service

Holt, Ernest G. Soil and wildlife conservation--a report of progress, pp. 78-82.

Soil and moisture conservation are prerequisite to wildlife conservation and a great deal can be done for wildlife through appropriate direction of the operations necessary for the conservation of soil and moisture. The factors most responsible for the destruction of vegetation and consequent erosion are tillage, overgrazing, and logging followed by fire. The fortunes of soils, plants, and animals are inextricably bound together. The single soil conservation measure of greatest importance to wildlife welfare is the elimination of domestic stock grazing from critical areas. More than half a million acres have been protected from grazing, and more than 100,000 acres have been returned to tree-growing. Fifty thousand miles of terraces, which make good travelways for wildlife, have been constructed. Some hundreds of ponds have been built and enclosed, thus protecting both water and food supplies for wildlife. More than 15 million food-producing shrubs have been planted on areas reclaimed from erosion. In excess of 8,000 winter feeding stations have been provided.

Management: Squirrels in Texas

Goodrum, Phil. Notes on the gray and fox squirrels of Eastern Texas, pp. 499-504.

About the same material as abstracted in WILDLIFE REVIEW, No. 10, October 1937, p. 20.

Management: Stocking, chukar partridge

Bade, August. The chukor partridge in California, pp. 485-489.

Climatic diversities in California, and adaptability of this bird to some of them. Up to the close of the year 1936, 4,600 had been propagated and released; some are known to have bred in the field, and to have survived in difficult situations. Captive hens have laid no fewer than from 106 to 136 eggs in a season; the species does well under domestic conditions.

Management: Stocking, Reeves pheasant

Edminster, F. C. The Reeves pheasant in New York, pp. 490-493.

Account of attempts varying in kind and in different localities to establish the species, all unsuccessful.

Management: Stocking, ring-necked pheasant

Wallace, George. Vermont's pheasant situation, pp. 340-345.

Planting of pheasants has been in progress 17 years but has never been successful in certain parts of the State. The physiographic regions and their apparent qualifications as pheasant territory are described. The Lake Champlain and Connecticut River valleys are the best areas. Apparently the investigation was precipitated by an unusual decline of pheasants in even the favorable regions, and after discussing possible causes, the author is unable to settle upon any as decisive. [The same conclusion was reached by Bump of New York; see WILDLIFE REVIEW, No. 11, February 1938, p. 10.] Wallace, however, offers an opinion, saying, "Offhand, it would seem that severer than usual climatic conditions have been the principal limiting factor." He concludes that some sections of the State are totally unsuited to pheasants, others well suited, and others intermediate in capacity. Stocking should be abandoned in the first type, continued in the second, and further experimented with in the third. [The inhumane aspect of stocking birds in areas where they cannot possibly survive seems not to have been considered.]

Management: Stocking, wild turkey

Blakey, Harold L. Wild turkey management on the Missouri Ozark Range, pp. 494-498.

Much Missouri land is suitable for wild turkeys and considerable revenue would result if it were adequately stocked. A 10-year restocking program appears to have had negative results, so improvement is being sought through changed practices on protected areas in national forests and by use of the best available wild strain. There is much illegal killing. For a fuller account of the matter, see Wildlife Research and Management Leaflet BS-77, abstract of which appeared in WILDLIFE REVIEW, No. 8, April 1937, p. 33.

Management: Winter feeding, advisability of

Kalmbach, E. R., and Don R. Coburn. Disease factors in reported cases of starvation in waterfowl, pp. 404-410, 1 table.

Report on field investigation and necropsies of ducks reported to be starving in winter in southern Idaho. Post-mortem examination of 90 specimens showed food present in the alimentary tracts of 52; parasitism, apparently the cause of death, was noted in 61, and mycosis, lead-poisoning, and mechanical injury in 4, 11, and 12 individuals, respectively. The mortality, hardly more severe than what may be considered normal for the season, was not primarily or even largely due to starvation. In such cases, feeding tends to concentrate parasitized and otherwise subnormal birds in spots where the still predominantly healthy birds also are attracted. There is a real danger in concentrating healthy and diseased birds day after day on the same feeding grounds and on the other hand, there is no evidence that feeding rehabilitates the ailing birds. A question is therefore raised as to whether the feeding may be not only false humanitarianism but even misguided game management.

Research: Control methods

Garlough, F. E. Research studies in the control of destructive mammals, pp. 303-310.

This paper previously distributed under the same title as Wildlife Research and Management Leaflet BS-91 was abstracted in WILDLIFE REVIEW, No. 9, July 1937, p. 36.

Research: Results of Federal-State cooperative units

Jackson, H. H. T. Some accomplishments of the cooperative research units--a summary to January 31, 1937, pp. 108-118.

Report of progress for 9 units, the oldest of which had been in operation only 17 months. Methods and accomplishments are described with particular reference to the subject mentioned in connection with the States which are treated in the order of establishment of the units: Virginia, wild turkey, bobwhite, gray fox; Oregon, small game, wildlife extension, and administration, sex ratio of deer; Iowa, cottontail, ducks, wildlife diseases, muskrat, pay shooting of bobwhite and pheasant, extension work; Connecticut, cover mapping, regulated shooting, cottontail, farm game, analysis of game kill; Alabama, mourning dove, bobwhite, white-tailed deer, waterfowl food supply; Texas, wildlife resources of Walker County, ecology of cut-over lands, quail, prairie chicken, squirrels, extension; Maine, forest-game relationships, woodcock, fish-eating birds; Utah, mule deer, beaver, sage grouse, sharp-tailed grouse, waterfowl food plants; Ohio, squirrels, controlled hunting, Hungarian partridge, pheasant, extension. A later report is abstracted in WILDLIFE REVIEW, No. 11, February 1938, p. 34.

Research: Need of

Leopold, Aldo. The research program, pp. 104-107.

A stimulative but perhaps overgloomy review of the research situation; needs in this field and in that of education of the landowners to appreciation of wildlife problems.

Research: Texas cooperative unit

Taylor, Walter P. Wildlife management demonstration on a county-wide basis, pp. 47-55.

Objectives of the Texas cooperative wildlife research unit and specifically those of the Walker County wildlife surveys, which are: "To determine what kind of game and non-game birds and mammals are present; also what other vertebrates are present, the reptile and amphibian population; so far as practicable to count them. To make representative collections of vertebrates for use in teaching and research. To observe not only what animals are present, but what they are doing; that is, to find out not only what is in the woods, but what is happening there. To bring to light former wildlife conditions so that programs for restoration and conservation may be based upon reasonable grounds. To study existing forest and farm practices with the object in view of determining how far game conservation methods can be adapted to what is now going on in the country."

Progress made in the surveys; need of diversification in natural crops; values of diversification; importance of the ecological concept and a broad view of management. Success in the work to date has largely been in development of means of doing it, including a practical method of counting quail. The relation of blue jays, squirrels, and pigs to the bobwhite, and certain other factors bearing upon the welfare of that species, have been worked out.

Research: Woodcock management methods

Aldous, C. M. Woodcock management studies in Maine, pp. 582-588.

The woodcock breeds chiefly and winters almost entirely in the United States so its fate depends upon usonian policies. The bird appears to be holding its own in the Northeast where in Maine, Nova Scotia, and New Brunswick the species breeds apparently more commonly than anywhere else. Weights ranged from 4-1/2 to 10, and averaged 6-1/2, ounces. Migrants from the north averaged 1/2 ounce heavier than resident birds. A satisfactory and economical census method has not yet been developed. Hunting appears to be more important than any natural cause of mortality, and possibly more important than all causes combined. Figures for kill in 4 States. Predators discussed; the house cat probably most important. Drouth seems to be the most destructive climatic factor. Notes on preferred cover and the necessity of clearings for mating performances.

SPECIAL ARTICLES

Plant names indicating utilization by wildlife

Among the more interesting names of plants are those embodying reference to animals. They are of many sorts, one class of which, namely, those denoting use by animals, comprises the subject matter of this sketch. The content of the present article is further restricted to terms alluding to mammals and birds only, as being of most interest to wildlife managers. American usage also is a basic criterion for the compilation, this provision excluding numerous terms seen in books that are obviously borrowed from foreign sources. It is doubtful whether any of these have real currency in the United States.

There are numerous plant names compounded from those of animals that do not indicate usage, for example such association terms as buffalo-bur and dogtown grass, those of deprecatory significance as skunkcabbage and wolfbean, and those suggested by fancied resemblances as moose elm and porcupine grass. Some are named facetiously as coyote melon (for a gourd) and wolf grape (for a nightshade), and some are misnamed as buckbean (a corruption of bogbean).

Nevertheless there is more wheat than chaff and the hope is that it is here properly sorted. An attempt has been made to indicate wildlife utilization of the plants, not necessarily restricted to that referred to in the name. The abbreviations have the same significance as in U. S. Department of Agriculture Circular 412, "Groups of Plants Valuable for Wildlife Utilization and Erosion Control," namely, C-cover, B-browse, H-herbage, M-mast, F-fruit, and S-seed. Other words indicating use are spelled out.

These animal-plant terms embody the observations of people close to nature, of generations of them, in some instances, and may be taken as useful hints by the wildlife manager. The animal group that has the largest number of plant names associated with its own is that of deer with 18 entries under buck, 18 under deer, and 2 under stag, and the plant that has been named for the greatest variety of animals is Mitchella repens with appellations dedicating it to 8 different birds and mammals. The plant families most numerously represented by groups with wildlife connected appellations are Graminae, 11; Fagaceae, 11; Rosaceae, 10; Papilionaceae, 14; Ericaceae, 14; and Caprifoliaceae, 11.

The scientific names of the plants, in the main, and their systematic arrangement follow Heller's Catalogue 2nd edit. 1900, which, strangely and regrettably, is still the latest general list of nearctic plants. Two arrangements of the names are presented, one alphabetically by the vernacular plant names with their scientific equivalents indented, and the other giving the scientific names in systematic order, each accompanied by the animal-derived vernaculars that have been gathered for the present paper. Additions will be appreciatively received.

Alphabetic Register

Antelope-brush
Purshia tridentata B
Lygodesmia spinosa B

Antelope-sage
Eriogonum jamesii H

Bat tree
Magnolia grandiflora C?

Bearberry
Rubus canadensis F
Empetrum nigrum F
Ilex decidua F
Rhamnus purshiana F
Garrya wrightii F
Cornus canadensis F
Arctostaphylos spp. F
Menziesia alpina F
Oxycoccus spp. F
Lonicera involucrata (also called bearberry honeysuckle) F

Bearberry tree
Rhamnus purshiana F

Bear brush
Garrya fremontii F

Bear bush
Ilex glabra F

Bear-cabbage
Hydrophyllum capitatum H

Bear corn
Veratrum viride Roots?

Beargrass
Xerophyllum spp. (There are several other beargrasses, for none of which, however, does the name seem to indicate use) Roots

Bear-gum
Nyssa ursina (note scientific name also) F

Bear huckleberry
Gaylussacia ursina (note scientific name also) F

Bear lily
Xerophyllum tenax Roots

Bear oak
Quercus ilicifolia M

Bear's-bilberry
Arctostaphylos uva-ursi F

Bear's-grape
Arctostaphylos uva-ursi F

Bear's-whortleberry
Arctostaphylos uva-ursi F

Bearwood
Rhamnus purshiana F

Beaver lily
Nymphaea advena H

Beaverroot
Nymphaea advena H

Beaver tree
Magnolia virginiana B?

Beaver-wood
Celtis occidentalis B?

Birdberry
Ampelopsis arborea F

Bird cherry
Prunus pennsylvanica F

Bird pepper
Capsicum spp. F

Birdseed
Lepidium spp. S
Senecio vulgaris S

Birdseed peppergrass
Lepidium alyssoides S

	Nesting material
Bird's-nest weed	
Froelichia drummondi	
Bird's-pepper	
Lepidium virginicum	S
Bird vetch	
Vicia cracca	S
Blackbird oats	
Zizania aquatica	S
Brant grass	
Zostera marina	H
Brant salad	
Enteromorpha	H
Ulva	H
Buckberry	
Gaylussacia ursina	F
Polycodium spp.	F
Buckbrush	
Peraphyllum ramosissimum	C
Dasiophora fruticosa	B
Cercocarpus spp.	CB
Purshia tridentata	CB
Lotus scoparius	B
Ceanothus spp.	BC
Elaeagnus argentea	BF
Adelia pubescens	BF
Lycium spp.	BF
Anisacanthus thurberi	B
Symphoricarpos spp.	CBF
Lonicera utahensis	BF
Buckbush	
Symphoricarpos spp.	BF
Bucknut	
Simondsia californica	BS
Buck oak	
Quercus borealis maxima	B?
Quercus coccinea	B?
Buckwood	
Acer pennsylvanicum	B

Buffalo apple	
Astragalus caryocarpus	Roots?
Buffalo bean	
Astragalus caryocarpus	Roots?
Buffalo berry	
Lepargyrea argentea	B
Buffalo bunchgrass	
Festuca scabrella	H
Buffalo clover	
Lupinus texensis	H
Trifolium reflexum	H
Buffalo currant	
Ribes odoratum	B?
Buffalo grass	
Boutelcua hirsuta	H
Boutelcua oligostachya	H
Bulbilis dactyloides	H
Buffalo nut	
Pyrularia pubera	B?
Buffalo pea	
Thermopsis montana	H
Astragalus caryocarpus	Roots?
Oxytropis lamberti	H?
Vicia americana	H
Buffalo rye	
Elymus spp.	H
Buffalo weed	
Astragalus mexicana	H?
Canvas-back duck-food	
Vallisneria spiralis	H
Canvas-back grass	
Vallisneria spiralis	H
Coon grape	
Berchemia scandens	F?
Vitis labrusca	F

Coyote-bush	
Baccharis pilularis	C?
Crowberry	
Juniperus communis	F
Oxycoccus oxycoccus	F
Empetrum nigrum	F
Arctostaphylos uva-ursi	F
Adelia porulosa	F
Crow corn	
Alotris farinosa	Roots?
Crow pea	
Empetrum nigrum	F
Curlew-berry	
Empetrum nigrum	F
Deer berry	
Ilex vomitoria	BF
Gaultheria procumbens	BF
Polycodium spp.	BF
Mitchella repens	HF
Symphoricarpos spp.	BF
Deer-briar	
Ceanothus fendleri	CB
Deer-brush	
Cercocarpus spp.	CB
Purshia tridentata	CB
Ceanothus spp.	CB
Symphoricarpos oreophilus	CBF
Deer clover	
Lotus spp.	H
Deer food	
Brasenia schreberi	H
Deergrass	
Muhlenbergia spp.	H
Rhexia virginica	H
Deer laurel	
Rhododendron maximum	CB
Deer moss	
Tillandsia usneoides	H
Deer oak	
Quercus sadleriana	HM
Deer pea	
Lotus spp.	H
Vicia ludoviciana	H
Deervetch	
Lotus spp.	H
Deer vine	
Linnaea borealis americana	H
Deer weed	
Lotus scoparius	B
Lotus spp.	H
Deerwood	
Ostrya virginiana	B
Doveweed	
Croton spp.	S
Duck acorn	
Nelumbo lutea	S
Duck celery	
Vallisneria spiralis	H
Duck corn	
Peltandra virginica	S
Duck food, Blue	
Echinochloa crusgalli	S
Duck grass	
Potamogeton pectinatus	HS
Potamogeton perfoliatus	HS
Ruppia maritima	HS
Duck lettuce	
Atriplex hastata	H
Duck millet	
Echinochloa crusgalli (also with prefixes blue and wild)	S
Duck moss	
Potamogeton pectinatus	HS
Naias guadelupensis (with profix gray, the gray duck being the gadwall)	HS

Duck oak
Quercus nigra M

Duck oats
Zizania aquatica HS

Duck potato
Sagittaria spp. Tubers

Duck sparrowgrass (i.e. asparagus)
Ceratophyllum demersum HS

Duck rice
Echinochloa crusgalli S
Zizania aquatica HS

Duck's-meat (see duckweed)

Duckweed
Zostera marina H
Lemnaceae H

Duck wheat
Fagopyrum fagopyrum (trade name) S

Elk bark
Magnolia macrophylla B?
Magnolia virginiana B?

Elk browse
Magnolia tripetala B?

Elk clover
Aralia californica H

Elk grass
Carex geyeri H
Xerophyllum tenax H

Elk nut
Pyrularia pubera B?

Elk sedge
Carex geyeri H

Elkslip
Caltha leptosepala H

Elk tree
Oxydendron arboreum B?

Elkwood
Magnolia tripetala B?
Magnolia acuminata B?
Magnolia macrophylla B?

Foxberry
Arctostaphylos uva-ursi F
Vaccinium vitis-idaea F
Mitchella repens F

Fox grape
Vitis cordifolia F
Vitis labrusca F

Fox plum
Arctostaphylos uva-ursi F

Goose buckwheat
Fagopyrum fagopyrum (trade name) S

Goosegrass
Sagittaria teres H
Echinochloa crusgalli H
Triglochin maritima H
Puccinellia spp. H
Scirpus robustus H

Ground hog salad
Saxifraga erosa H

Ground squirrel pea
Jeffersonia diphylla Tubers

Grouseberry
Gaultheria procumbens BF
Gaylussacia dumosa BF
Vaccinium scoparium BF
Viburnum opulus americanum F

Grouse whortleberry
Vaccinium scoparium BF

Heath-hen plum
Mitchella repens HF

Hummingbird's sage
Ramona grandiflora Nectar

Hummingbird's trumpet
Zauschneria californica Nectar

Mallard-weeds
Lemnaceae H

Mooseberry
Viburnum alnifolium BF

Moosebush
Viburnum alnifolium BF

Moose maple
Acer spicatum B

Moosewood
Acer pennsylvanicum B
Dirca palustris B
Viburnum alnifolium BF

Muskrat potato
Sagittaria latifolia Tubers

Musquash- or muskrat-weed
Thalictrum polygamum H?

Partridgeberry
Gaultheria procumbens BF
Chiogenes hispidula HF
Mitchella repens HF
Symphoricarpos spp. F

Partridge-pea
Chamaecrista spp. S

Partridge vine
Mitchella repens HF

Peter-grass
Ruppia maritima (for the Blue Peter or Coot) H

Pheasant-berry
Mitchella repens HF

Pigeonberry
Phytolacca americana F
Amelanchier alnifolia F
Rubus triflorus F
Empetrum nigrum F
Ilex verticillata F
Rhamnus spp. F
Aralia hispida F
Cornus alternifolia F
Mitchella repens F

Pigeon cherry
Prunus pennsylvanica F

Pigeon grape
Vitis aestivalis F

Pigeon grass
Chaetochloa spp. S

Pigeon plum
Coccolobis laurifolia F
Mitchella repens F

Pigeon-root
Claytonia lanceolata Tubers

Pigeon tree
Aralia spinosa F

Pigeonwood
Fiscnia longifolia F

Possum grape
Vitis cordifolia F

Possumhaw
Ilex decidua F
Viburnum nudum F

Possum oak
Quercus nigra M?

Possum plum
Prunus minutiflora F

Possum thorn
Viburnum nudum F

Possumwood
Diospyros virginiana F

Ptarmiganberry
Mairania alpina BF

Puldoo-grass
Ruppia maritima (for the poule d'eau or coot) H

Quailberry
Symphoricarpos occidentalis CF

Quail brush
Atriplex lentiformis CS
Cercocarpus spp. C

Quail's-delight
Chaetochloa italica S

Rabbitberry
Lepargyrea argentea LF
Mitchella repens HF

Rabbitbrush
Cercocarpus spp. C
Gutierrezia sarothrae C?
Aplopappus bloomeri B
Chrysothamnus spp. CBH

Rabbitbush
Amorpha fruticosa H
Gutierrezia spp. C?

Rabbit pea
Tephrosia virginica H

Rabbit sage
Chrysothamnus spp. HC

Rabbit's-root
Aralia nudicaulis H

Rabbit thorn
Lycium spp. CB

Rabbit tobacco
Gnaphalium spp. H

Rabbit vine
Apios tuberosa H

Rabbitweed
Gutierrezia sarothrae C?
Bigelovia graveolens H?

Rabbitwood
Tyrularia pubera B?

Raccoonberry
Podophyllum peltatum F?

Raccoon grape
Vitis labrusca F
Ampelopsis cordata F

Redhead-grass
Potamogeton perfoliatus HS
Ruppia maritima HS

Squirrelcorn
Bicuculla canadensis Tubers
Capnoides spp. Tubers

Stag-berry
Symphoricarpos occidentalis BF

Stagbush
Viburnum prunifolium BF

Swan potato
Sagittaria latifolia Tubers

Turkey apple
Crataegus induta F

Turkeyberry
Ilex decidua F
Solanum torvum F
Mitchella repens F
Symphoricarpos orbiculatus F

Turkey corn
Bicuculla spp. Tubers

Turkey grape
Vitis lincecumi F

Turkey oak
Quercus catesbaei M
Quercus cinerea M
Quercus imbricaria M
Quercus rubra M
Quercus stellata M
Quercus triloba M

Turkey pea
Bicuculla canadensis Tubers
Thermopsis montana Pods?
Tephrosia virginica Pods?
Erigenia bulbosa Tubers

Turkey pod
Stenophragma thaliana Pods

Wigeongrass
Zostera marina HS
Potamogeton nuttallii HS
Ruppia maritima HS

Woodpecker hickory
Hicoria alba Sap

Systematic Register

ULVACEAE
Enteromorpha
Brant salad

Ulva
Brant salad

PINACEAE
Juniperus communis
Crowberry

POTAMOGETONACEAE
Zostera marina
Brant grass
Duckweed
Wigeongrass

Potamogeton nuttallii
Wigeongrass

Potamogeton pectinatus
Duck grass
Duck moss

Potamogeton perfoliatus
Duck grass
Redhead-grass

Ruppia maritima
Duck grass
Peter-grass (for the Blue Peter or Coot)
Pulico-grass (for the Poule d'eau or Coot)
Redhead-grass
Wigeongrass

NAIADACEAE
Naias guadelupensis
Duck moss (with prefix gray, the gray duck being the gadwall)

JUNCAGINACEAE
Triglochin maritima
Goosegrass

ALISMACEAE
Sagittaria latifolia
Muskrat potato
Swan potato

Sagittaria teres
Goosegrass

Sagittaria spp.
Duck potato

HYDROCHARITACEAE
Vallisneria spiralis
Canvas-back duck-food
Canvas-back grass
Duck celery

GRAMINEAE
Echinochloa crusgalli
Duck food, Blue
Duck millet (also with prefixes blue and wild)
Duck rice
Goosegrass

Chaetochloa italica
Quail's-delight

Chaetochloa spp.
Pigeon grass

Zizania aquatica
Blackbird oats
Duck oats
Duck rice

Muhlenbergia spp.
Deergrass

GRAMINEAE--Continued
Bouteloua hirsuta
Buffalo grass

Bouteloua oligostachya
Buffalo grass

Bulbilis dactyloides
Buffalo grass

Tuccinnellia spp.
Goosegrass

Festuca scabrella
Buffalo bunchgrass

Elymus spp.
Buffalo ryes

CYPERACEAE
Scirpus robustus
Goosegrass

Carex geyeri
Elk grass
Elk sedge

ARACEAE
Peltandra virginica
Duck corn

LEMNACEAE
Lemnaceae
Duckweeds
Mallard-weeds

BROMELIACEAE
Tillandsia usneoides
Deer moss

LILIACEAE
Xerophyllum tenax
Elk grass
Bear lily

Xerophyllum spp.
Beargrass (there are several other beargrasses, for none of which, however, does the name seem to indicate use)

LILIACEAE--Continued
Veratrum viride
Bear corn

Aletris farinosa
Crow corn

JUGLANDACEAE
Hicoria alba
Woodpecker hickory

BETULACEAE
Ostrya virginiana
Deerwood

FAGACEAE
Quercus borealis maxima
Buck oak

Quercus catesbaei
Turkey oak

Quercus cinerea
Turkey oak

Quercus coccinea
Buck oak

Quercus ilicifolia
Bear oak

Quercus imbricaria
Turkey oak

Quercus nigra
Duck oak
Possum oak

Quercus rubra
Turkey oak

Quercus sadleriana
Deer oak

Quercus stellata
Turkey oak

Quercus triloba
Turkey oak

ULMACEAE
Celtis occidentalis
Beaverwood

SANTALACEAE
Pyrularia pubera
Buffalo nut
Elk nut
Rabbitwood

POLYGONACEAE
Eriogonum jamesii
Antelope-sage

Fagopyrum fagopyrum
Duck wheat (trade name)
Goose buckwheat (trade name)

Coccolobis laurifolia
Pigeon plum

CHENOPODIACEAE
Atriplex hastata
Duck lettuce

Atriplex lentiformis
Quail brush

AMARANTHACEAE
Froelichia drummondi
Bird's-nest weed (nesting material)

PHYTOLACCACEAE
Phytolacca americana
Pigeonberry

NYCTAGINACEAE
Pisonia longifolia
Pigeonwood

PORTULACACEAE
Claytonia lanceolata
Pigeon-root

NYMPHAEACEAE
Nelumbo lutea
Duck acorn

Brasenia schreberi
Deer food

NYMPHAEACEAE--Continued
Nymphaea advena
Beaver lily
Beaver-root

CERATOPHYLLACEAE
Ceratophyllum demersum
Duck sparrowgrass (i.e. asparagus)

MAGNOLIACEAE
Magnolia acuminata
Elkwood

Magnolia grandiflora
Bat tree

Magnolia macrophylla
Elk bark
Elkwood

Magnolia tripetala
Elk browse
Elkwood

Magnolia virginiana
Beaver tree
Elk bark

RANUNCULACEAE
Caltha leptosepala
Elkslip

Thalictrum polygamum
Musquash- or muskrat-weed

BERBERIDACEAE
Podophyllum peltatum
Raccoonberry

Jeffersonia diphylla
Ground squirrel pea

FUMARIACEAE
Bicuculla canadensis
Squirrelcorn
Turkey pea

Bicuculla spp.
Turkey corn

FUMARIACEAE--Continued
Capnoides spp.
Squirrelcorn

CRUCIFERAE
Lepidium alyssoides
Birdseed peppergrass

Lepidium virginicum
Bird's-pepper

Lepidium spp.
Birdseed

Stenophragma thaliana
Turkey pod

SAXIFRAGACEAE
Saxifraga erosa
Ground hog salad

GROSSULARIACEAE
Ribes odoratum
Buffalo currant

ROSACEAE
Crataegus induta
Turkey apple

Amelanchier alnifolia
Pigeonberry

Peraphyllum ramosissimum
Buckbrush

Rubus canadensis
Bearberry

Rubus triflorus
Pigeonberry

Dasiophora fruticosa
Buckbrush

Cercocarpus spp.
Buckbrush
Deer-brush
Quailbrush
Rabbitbrush

ROSACEAE--Continued
Purshia tridentata
Antelope-brush
Buckbrush
Deer-brush

Prunus minutiflora
Possum plum

Prunus pennsylvanica
Bird cherry
Pigeon cherry

CAESALPINACEAE
Chamaecrista spp.
Partridge-pea

PAPILIONACEAE
Thermopsis montana
Buffalo pea
Turkey pea

Lupinus texensis
Buffalo clover

Trifolium reflexum
Buffalo clover

Lotus scoparius
Buckbrush
Deer weed

Lotus spp.
Deer clover
Deer pea
Deervetch
Deer weed

Amorpha fruticosa
Rabbitbush

Tephrosia virginica
Rabbit pea
Turkey pea

Astragulus caryocarpus
Buffalo apple
Buffalo bean
Buffalo pea

PAPILIONACEAE--Continued
Astragalus mexicana
Buffalo weed

Oxytropis lamberti
Buffalo pea
Vicia americana
Buffalo pea

Vicia cracca
Bird vetch

Vicia ludoviciana
Deer pea

Apios tuberosa
Rabbit vine

EUPHORBIACEAE
Croton spp.
Doveweed

EMPETRACEAE
Empetrum nigrum
Bearberry
Crowberry
Crow pea
Curlew-berry
Pigeonberry

BUXACEAE
Simondsia californica
Bucknut

AQUIFOLIACEAE
Ilex decidua
Bearberry
Possumhaw
Turkeyberry

Ilex glabra
Bearbush

Ilex verticillata
Pigeonberry

Ilex vomitoria
Deer berry

ACERACEAE
Acer pennsylvanicum
Buckwood
Moosewood

Acer spicatum
Moose maple

RHAMNACEAE
Berchemia scandens
Coon grape

Rhamnus purshiana
Bearberry
Bearberry tree
Bearwood

Rhamnus spp.
Pigeonberry

Ceanothus fendleri
Deer-briar

Ceanothus spp.
Buckbrush
Deer-brush

VITACEAE
Vitis aestivalis
Pigeon grape

Vitis cordifolia
Fox-grape
Possum grape

Vitis labrusca
Coon grape
Fox-grape
Raccoon grape

Vitis lincecumi
Turkey grape

Ampelopsis arborea
Birdberry

Ampelopsis cordata
Raccoon grape

THYMELACEAE
Dirca palustris
Moosewood

ELAEAGNACEAE
Lepargyrea argentea
Rabbitberry

Lepargyrea spp.
Buffalo berry

Elaeagnus argentea
Buckbrush

MELASTOMACEAE
Rhexia virginica
Deergrass

ONAGRACEAE
Zauschneria californica
Hummingbird's trumpet

ARALIACEAE
Aralia californica
Elk clover

Aralia hispida
Pigeonberry

Aralia nudicaulis
Rabbit's-root

Aralia spinosa
Pigeon tree

UMBELLIFERAE
Erigenia bulbosa
Turkey pea

CORNACEAE
Garrya fremontii
Bearbrush

Garrya wrightii
Bearberry

Nyssa ursina
Bear-gum (note scientific name also)

Cornus alternifolia
Pigeonberry

CORNACEAE--Continued
Cornus canadensis
Bearberry

ERICACEAE
Rhododendron maximum
Deer laurel

Oxydendron arboreum
Elk tree

Gaultheria procumbens
Deer berry
Grouseberry
Partridgeberry

Chiogenes hispidula
Partridgeberry

Arctostaphylos uva-ursi
Bear's-bilberry
Bear's-grape
Bear's-whortleberry
Crowberry
Foxberry
Fox plum

Arctostaphylos spp.
Bearberry

Mairania alpina
Bearberry
Ptarmiganberry

Gaylussacia dumosa
Grouseberry

Gaylussacia ursina
Bear huckleberry (note scientific name also)
Buckberry

Vaccinium scoparium
Grouseberry
Grouse whortleberry

Vaccinium vitis-idaea
Foxberry

Polycodium spp.
Buckberry
Deer berry

ERICACEAE--Continued
Oxycoccus oxycoccus
Crowberry

Oxycoccus spp.
Bearberry

EBENACEAE
Diospyros virginiana
Possumwood

OLEACEAE
Adelia porulosa
Crowberry

Adelia pubescens
Buckbrush

HYDROPHYLLACEAE
Hydrophyllum capitatum
Bear-cabbage

LABIATAE
Ramona grandiflora
Hummingbird's sage

SOLANACEAE
Lycium spp.
Buckbrush
Rabbit thorn

Capsicum spp.
Birdpepper

Solanum torvum
Turkeyberry

ACANTHACEAE
Anisacanthus thurberi
Buckbrush

RUBIACEAE
Mitchella repens
Deer berry
Foxberry
Heath-hen plum
Partridgeberry
Partridge vine
Pheasant-berry
Pigeonberry
Pigeon plum

Mitchella repens--Continued
Rabbitberry
Turkeyberry

CAPRIFOLIACEAE
Viburnum alnifolium
Mooseberry
Moosebush
Moosewood

Viburnum nudum
Possumhaw
Possum thorn

Viburnum opulus americanum
Grouseberry

Viburnum prunifolium
Stagbush

Symphoricarpos occidentalis
Quailberry
Stag-berry

Symphoricarpos orbiculatus
Turkeyberry

Symphoricarpos oreophilus
Deer-brush

Symphoricarpos spp.
Buckbrush
Buckbush
Deer berry
Partridgeberry

Linnaea borealis americana
Deer vine

Lonicera involucrata
Bearberry (also called bearberry honeysuckle)

Lonicera utahensis
Buckbrush

COMPOSITAE
Gutierrezia sarothrae
Rabbitbrush
Rabbitweed

COMPOSITAE--Continued
Gutierrozia spp.
Rabbitbush

Aplopappus bloomeri
Rabbitbrush

Bigelovia graveolens
Rabbitweed

Chrysothamnus spp.
Rabbitbrush
Rabbit sage

COMPOSITAE--Continued
Baccharis pilularis
Coyote-bush

Gnaphalium spp.
Rabbit tobacco

Senecio vulgaris
Birdseed

CICHORIACEAE
Lygodesmia spinosa
Antelope-brush

Duties of a Chief Forester and Game Technician with the Farm Security Administration substantially as written by Palmer L. Hahn

[The following outline of the work, prepared without thought of publication, seemed so thorough and informing that permission was sought to reproduce it, a request kindly granted by Mr. Hahn.]

I am at present [Nov. 2, 1937] with the Farm Security Administration as Chief Forester and Game Technician for the State of Delaware. I have held my present position for two years and am still employed. In this work I have had as many as 700 to 800 men working under me at one time depending on the season of the year and the amount of work to be done. My work on this project consists of the following phases of wildlife and forest management:

A. WILDLIFE MANAGEMENT
1. Laying out plans for development and maintenance.
2. Biological conditioning.
3. Research (field): Food and cover requirements, nesting areas, etc.
4. Lake and pond development and the stabilization of water or water conservation, planning and construction of wild fowl nesting islands, also spawning beds for fish.
5. Predator control and wildlife protection.
6. Nursery work: Seed collecting, planning and laying out of the nursery and supervision of planting.
7. Biological reconnaissance.
8. Mapping.
9. Drawing and tracing maps for blueprints and game findings.
10. Writing up reports on various phases of wildlife management and game findings.
11. Food and cover: Collecting, planting, improving.

B. FOREST MANAGEMENT
1. Firebreak and fireline construction, fire hazard reduction both general and along roads.
2. Nursery: Collection of seeds and cuttings for forestry and landscape purposes and the treatment of them.

3. Forest stand improvement: General silvicultural practices for weeding, thinning, cleaning, and releasing.
4. Tree surgery: Guying, pruning, and trimming of trees along roads and recreational areas and the treatment of the cuts to prevent disease.
5. Fire control: Observation towers, truck patrol, and walking.
6. Product conversion in forestry for cutting cordwood, fuelwood, poles, posts, timber, and yarding them for Government and private use.
7. Roadside improvement such as the elimination of poorly growing species to improve the general landscape.
8. Type mapping and timber cruising, including comprehensive reports.
9. Setting up money and labor quotas for all jobs on the project, including forestry, wildlife, general development, landscaping, and engineering.
10. Making of progress and development maps, tracings, and reports.
11. Laying out of foot trails.
12. Laying out and construction of roads and culverts; ditching and road maintenance.

A. WILDLIFE MANAGEMENT

1. One of the main duties is laying out plans for the development and maintenance of areas in the projects. In planning these various jobs, the following factors are given consideration: Justification from a financial, practical, and technical standpoint, and cost of materials, equipment, supplies, labor, supervision, overhead, and its relation to the money available. Key maps of the areas have the improvements marked on them as to location, usage, availability, and practicability. The land status of all properties is ascertained and in non-government land, permission secured for the work to be done. Folders are made up containing all of this information together with job or work descriptions, photographs, detailed drawings if necessary, cost analysis sheets, breakdown sheets, and job analysis statements. Every job on every area must be so described before work can proceed. After the jobs have been shown necessary and practical and money has been set up for them, the technical assistants and foremen must be instructed as to methods, little difficulties ironed out, and the necessary labor, equipment, and materials made available so that the work can proceed without undue cost and loss of time.

2. Biological conditioning consists of preparing and bettering the areas, releasing game food plants and shrubs along water, wood edges, ditches, and hedgerows. This work is done primarily for upland game such as the quail, pheasant, rabbit, and raccoon. Slash cuttings are made to bring in new growth and to increase the amount of palatable foliage for game; the slash from these operations was piled to provide escape coverts for wildlife. This work is done on the uplands and along ponds and the ocean front; in marshes it is for the benefit of muskrats and waterfowl; aquatic conditioning is essentially for migratory waterfowl.

3. Field research here consists of game food studies, finding nesting locations of game, their kind and species, and the amount of game on the area. On old abandoned farmlands, weed succession is studied especially in relation to the seed food supply for upland game. An attempt is made to learn why

various ponds have more wild fowl and fish than others. Experiments are under way on the use of west coast eelgrass as a food for brant. Studies are made as to character of botton and the resistance to disease of the plants. A field study has been made on the food, cover, and nesting requirements of the woodcock, quail, and black duck.

4. Lake and pond development work is done here on the Atlantic coastal beach and in both fresh and salt water ponds. Spawning beds are being made for smallmouth bass in the fresh water and cover also is provided. In our largest fresh water lake, spawning beds for black bass were constructed of logs placed in an oblong 8' by 4', fastened to the lake bottom by stakes, and the interior of the oblong filled with 6" to 8" of gravel, the top of the gravel averaging 18" below the water surface. Duck nesting islands have been made and found practical both in salt and fresh water ponds. In our small marsh ponds it has been found that small islands8' by 8' are suitable. We made them out of logs and filled the center of the crib with sand; on top of the same we set out marsh bushes and easily grown upland plants. To attract ducks we have added coarse gravel, whole oyster shells, and crushed shell on about one-half of the top of the island. This seems to draw the ducks and with plenty of food and protection has helped increase the wild fowl population. Many small ponds also have been made on the salt marshes to serve as feeding and resting areas for migratory waterfowl.

5. After careful studies, predator control has been explained to the local farmers. This education has been followed by the control of crows, foxes, cats, dogs, and snapping turtles. In order to build up the wildlife in general a campaign has been started to enlist the local man's help, the idea being to prevent illegal hunting, fishing, and trapping. During the fire season the fire guards act as game protectors. It is with the help of the fire guards and local farmers that we hope to protect our young stock and build up the wildlife population. So far this plan has proved effective in the case of Canada geese, black ducks, and wood ducks.

6. Nursery work was started in an old abandoned field where roads were built, ground and beds prepared, frames made and set in the ground, the beds fertilized and filled, sun screens made and set in the ground, a watering system installed, and after the seeds and cuttings had been planted the nursery was watered, cared for, and weeded. It is one of the few nurseries in the United States devoted to the propagation of wild game food plants and forest tree seedlings. There are 33 species growing at the present time. Game food seeds and berries as well as seeds and cuttings for forestry and landscape purposes receive special attention. The seeds and berries are treated by spreading them on jute cloth and allowing them to dry in the sun and then storing them preparatory to planting in the nursery the next spring. A large percentage of the cuttings for forestry, game, and nursery purposes are treated with Hormodin and then set out in frames after they have calloused over.

7. In biological reconnaissance, we census upland game, migratory waterfowl, and woodcock. The data recorded daily include the date, length of the inspection, species, and numbers. In connection with this work, data is accumulated on nests, as to number, location, and species; length of nesting

time, and number of eggs. The various facts and figures are correlated and reports written in order to educate the local hunter and contribute to proper management. So far this work has chiefly concerned quail, pheasant, ducks, fox, rabbit, and squirrel.

8. Mapping: Maps are made of the findings of reconnaissance. On the maps mentioned, we record biological, game, and natural features of the various sites, including nests, feed patches, tree and shrub growth, and type of soil.

9. Drawing maps and blueprints: As work develops, we make maps and tracings to show progress. The maps or blueprints are needed both in Washington and the Regional Office. In the field they make technical direction easier and surer of accomplishment. The progress maps show the location, date, amount, and symbol of each development. The development maps show the area prior to any period of development with the proposed new features indicated on them.

10. Writing reports: This requires for all game subjects a statement giving facts, figures, and suggestions on the various phases of wildlife management that are necessary.

11. Food and cover: Food and cover plantings were made for upland game such as quail, pheasant, rabbit, and raccoon. The following were sown: Millet, lespedeza, clover, alsike, corn, oat grass, and Kentucky blue grass. On the forest edges corn and nut trees were planted for the squirrels. In the fresh water ponds, food was planted to favor forage fish for smallmouth bass, bigmouth bass, warmouth, crappie, and perch. In both fresh water and salt water ponds, food and cover were planted for ducks, geese, and coots. Collections were made of the following and replanted: Eelgrass, wigeongrass, sago pondweed, and wild celery. Wild duck millet also was planted on mud flats. Although this is a Federal project, we have enlisted the cooperation of the State and local fish, game, and forestry men.

A. FOREST MANAGEMENT

1. Firebreak and fireline construction was one of the first jobs on this project, being needed to open the area for foot travel in case of fire or emergency. The work consisted in clearing out old woods roads and property boundaries. Here all inflammable material under 6" in diameter was removed but the green and moist ground cover left. It is hoped at a later date to plow the outside boundaries throwing up the mineral soil. Along roads and in recreational areas, dead trees, diseased trees, and trees liable to windthrow were cut up to usable size and the tops piled and burned. The fire hazard along the roads was carried back 40' from the road ditches. On old logged-over areas, slash if present in large quantity, was piled and burned; if not very abundant, it was lopped and scattered. Here, as in operations along roads, dead trees and stubs together with highly inflammable material were burned or lopped and scattered.

2. Nursery work was carried out along the lines mentioned under the Game Management section. The chief trees being propagated are loblolly pine, red and white oaks, walnuts, hickories, and black locust. The seeds are collected in the fall, dried, and stored until spring.

3. Forest stand improvement covers general silvicultural practices for weeding, thinning, cleaning, and releasing. One of our areas is typical of the central hardwood type; another site is loblolly pine, both in pure stands and mixed with hardwoods; a third includes a large quantity of cypress, partly in a pure stand and partly mixed with gums and other lowland timber species. The result is that forestry practice here has a wide scope. The site having the central hardwood type is being worked to favor the red and white oaks and the red gum. On the other sites the mixtures are so good that the general practice is to cut the available timber for governmental or private use by thinnings that will allow the canopy to fill in 5 to 10 years. On areas with weed trees, releasing of the loblolly is the principle operation. On all sites check plots have been set up to obtain data on growth, density, etc. Increment borings and ring counts according to D.B.H., species, and heights have been made on two sites.

4. Tree surgery is practiced where necessary along the main roads and around recreational areas. The work includes guying valuable trees where practical. In some instances limbs are cut off, the cut surface coated with a protective covering (a shellac and Bordeaux mixture) which is moisture and disease resistant.

5. Fire control is carried on during the spring and fall dry seasons. Our set-up consists of tower observation supplemented by telephone and truck patrol on one site. On the other sites our control is chiefly by foot and truck. Gangs for fighting fires have been established and assigned territories. The truck patrols carry sufficient equipment for one fire gang. The fire equipment generally consists of a flame thrower for back-firing, rakes, 5-gallon water tanks with hoses, 5-gallon water supply tanks, axes, bushhooks, and shovels. All sites have telephone communication for purposes of fire control and general supervision.

6. Product conversion is a distinct operation consisting of cutting down timber or polewood to specific dimensions for government and private use. Trees are marked for these purposes and instructions given for cutting, yarding, and the selection method to be used when cutting the trees. The chief products are cordwood, fuelwood, corduroy, poles, posts, and timber to be sawed into boards. The products are piled conveniently in cribs along woods roads or main roads. They are later removed by truck, tractor, or donkey and wagon. All of our rough timber is cut for such uses as culverts, bridges, picnic tables and benches, guard rails, docks, and cribs for duck islands and spawning beds.

7. Roadside improvement is practiced along the main county roads back a distance of 40' from the inside ditch edge. The purpose of this job is to create a better esthetic appeal. In this operation diseased and poorly growing trees are removed and holly, dogwood, and serviceberry are favored wherever possible. Tree stumps are cut very close to the ground so that they can hardly be seen. This operation is intensified on or near recreational areas.

8. All the areas have been type-mapped and one has had a comprehensive 80-page report rendered covering all the data necessary in a timber cruise.

Some of the contents of the report were: a map showing the area or strips cruised and the establishment or reproduction plots in the various timber types, cubic foot contents by species of trees, D.B.H. 6" to 10" and board foot contents by species of trees, D.B.H. over 10". Experimental plot data is included on height and diameter growth in which graphs show the differences under various conditions; in conclusion the data is summarized and suggestions given for future forest management practices on the various tracts of land.

9. Periodically new jobs develop and money is set up for the development program. For these, plans must be made for money set-up, labor, equipment, and materials on all the jobs for the project, including forestry, game, landscaping, engineering, and general development. Equipment charges must be known and quotations secured for supplies and materials. These are broken down in the same way as described in the first paragraph under Wildlife. Also there is a separation for unskilled labor, technicians, foremen, and semi-skilled workers.

10. Under the head of forestry, progress reports, monthly reports, and progress or development maps are prepared. Surplus forest products are regularly inventoried and offered for sale.

11. Foot trails have been laid out on the various sites to different points of interest. These trails are cut 4' wide and sanded for 3' of their width. This treatment makes a good looking and well wearing trail.

12. Part of the jobs also is the laying out of roads and truck trails, culverts, ditching, and regular road maintenance. The road construction varies from that on swamp and muck bottoms to sandy highland.

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The Georgia Sportsman. 50 cents a year. Dept. of Game and Fish, 412 State Capitol, Atlanta, Ga.

Game and Fish. Monthly. State Game and Fish Commission, Jackson, Miss.

Tennessee Wildlife. Monthly, $1.00 a year, single copy 15 cents. Tennessee Federation of Sportsmen, Noel Hotel, Nashville, Tenn.

The Coastal Sportsman. Monthly, single copy 5 cents. 2419 Ave. C, Beaumont, Texas.

Virginia Wildlife. Monthly, 25 cents a year. Blacksburg, Va.

Wisconsin Outdoors. Monthly, $1.00 a year, single copy 10 cents. Reedsburg, Wis.

The Wisconsin Sportsman. Monthly, $1.00 a year, single copy 10 cents. 2004 Winnebago St., Madison, Wis.

NOTES AND NEWS

The cooperative agreement between the Biological Survey and the Forest Service noted in WILDLIFE REVIEW, No. 3, April 1936, p. 15, has been revised, effective January 26, 1938, so as to specify in detail the responsibilities of the two bureaus. In general the allocation of duties affecting the wildlife program on the national forests may be described as research to the Biological Survey and management to the Forest Service.

Under a cooperative agreement between the University of Missouri, the Missouri Conservation Commission, and the Biological Survey, a new cooperative wildlife research unit was established at the University, at Columbia, on November 1, with Dr. Paul D. Dalke, formerly leader of the Connecticut Unit, in charge. Work at the Connecticut Unit will be continued under an arrangement whereby John Pearce, stationed at the Northeast Forest Experiment Station, New Haven, Conn., and Prof. A. E. Moss, head of the Department of Forestry, Connecticut State College, will look after the general program.

"The Natural Vegetation of Arizona" (Univ. of Arizona, Tucson, Tech. Bul. 68, pp. 181-222, 22 photos, 1 fig., July 1937), by A. A. Nichol, in addition to its expected content contains a good many notes on animals, some of them relating to food habits. A colored map of the principal plant associations of the State is a valuable feature.

"Wildlife Management in North Carolina," mimeographed in November and December 1937 and printed in January 1938, is devoted to the cooperative game management undertakings of the Zoology Department of the State College of Agriculture and Engineering and the Division of Game and Inland Fisheries of the State Department of Conservation and Development, at Raleigh. The contents of the January 1938 issue are indicated on page 26 of WILDLIFE REVIEW, No. 11, February 1938.

The Wisconsin Conservation Department, in view of the beneficial activities of most hawks, and the difficulties for laymen of identifying and selectively killing the injurious species, has suggested to County Clerks that no bounty be offered on any hawk. It is considered that the great horned owl is readily enough identified so that payment of a bounty on this species is sometimes justifiable. [Abstract of release dated February 2, 1938.]

The American Association for the Advancement of Science has issued a 12-page bibliography entitled "Conserving our Natural Resources". It cites author, publisher, title, pagination, and price, and briefly comments on leading recent works on the general subject of conservation and on such subdivisions as land use, forests, water, oil and gas, minerals, and wildlife. The names, addresses, and subscription rates of magazines devoted chiefly to conservation are given, as well as references to certain special conservation material that has appeared fairly recently in these and other periodicals. The bibliography was prepared by a committee consisting of: Dr. Joseph L. Wheeler (Chairman), Enoch Pratt Free Library of Baltimore; Dr. Edward W. Berry, Johns Hopkins University, Baltimore; Dr. Paul R. Heyl, Bureau of Standards, Washington, D.C.; Dr. Burton E. Livingston, Johns Hopkins University, Baltimore.

Copies of this bibliography may be obtained by applying to the Permanent Secretary of the Association, Smithsonian Institution Building, Washington, D.C.

"Knowing Your Trees" is a book in which accounts that have appeared in American Forests of 50 species of trees are reproduced. Each unit of the series includes descriptive matter covering the characteristics, and economic importance of the species, photographs of typical specimen, and of its bark, and other diagnostic details, and in addition a range map. The work is attractive in make-up, both inside and out; it may be obtained from The American Forestry Association, Washington, D. C.

Two bird books that readers of WILDLIFE REVIEW may wish to know about are among recent publications. "The Book of Birds" in two volumes, each of more than 350 pages and lavishly illustrated, assembles articles that have been published from time to time in The National Geographic Magazine. There are 204 color plates by Allan Brooks. The work may be obtained from the National Geographic Society, Washington, D. C., for $5.00 per set.

"Bird Studies at Old Cape May" embodies observations by its author, Witmer Stone, extending over a period of 48 years as well as recorded data on birds of the New Jersey and Delaware coasts. It comprises two volumes totalling more than 950 pages, and is also very fully and interestingly illustrated with photographs, 2 colored plates, 1 full page etching, and many line drawings of birds and landscapes, mostly contributed by friends of the author. These books are being handled by the Delaware Valley Ornithological Club, c/o Academy of Natural Sciences, Philadelphia, Pa.; price $6.00 for the two.

Wilderness News of which No. 6 was issued in October 1937 is a multilithed periodical devoted to the interests of the Wilderness Society. Those interested may address the Editor at 1840 Mintwood Place, Washington, D. C.

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